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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/618,527

07/11/2003

Tien-I Bao

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EXAMINER

GUERRERO, MARIA F

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 07/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/618,527

Applicant(s)

BAO ET AL.

Examiner

Maria Guerrero

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Handwritten signature

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8-16 and 18-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-16 and 18-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the amendment filed May 17, 2004.

Claims 7 and 17 are canceled.

Claims 1-6, 8-16, and 18-20 are pending.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3-4, 6, and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Ngo et al. (U.S. 6,093,973).

Ngo et al. teaches forming a nitrogen-free silicon oxide layer having a refractive index of 1.47 (the extinction coefficient inherently is 0) overlying an antireflective structure, forming a patterned photoresist layer overlying the nitrogen-free silicon oxide layer (Abstract, Fig. 3, col. 2, lines 40-45, col. 4, lines 14-28, 65-67, col. 5, lines 1-4).

Ngo et al. is silent about the nitrogen-free silicon oxide layer serving as a protective layer and removing the patterned photoresist layer. However, the nitrogen-free silicon oxide layer serving as a protective layer and the step of removing the patterned photoresist layer are inherent because necessarily flows from Ngo et al. reference. Ngo et al. shows the oxide as a hard mask and forming metal interconnections; therefore,

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the patterned photoresist layer is removed and the nitrogen-free silicon oxide layer is serving as a protective layer (Abstract, col. 6, lines 25-45).

Ngo et al. discloses the antireflective structure having one silicon oxynitride layer as conventional in the art (col. 1, lines 40-45). Ngo et al. teaches the nitrogen-free silicon oxide layer having a thickness of no greater than 350 angstroms and being formed by plasma enhanced chemical vapor deposition (col. 2, lines 57-60, col. 4, lines 41-45).

The claiming of a new use, new function or unknown property, which is inherently present in the prior art, does not necessarily make the claim patentable. In re Best, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977).

The elements must be arranged as required by the claim, but this is not an ipsissimis verbis test, i.e., identity of terminology is not required. In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ngo et al. (U.S. 6,093,973) in view of Lee et al. (U.S. 6,376,392) and Xu et al. (U.S. 6,656,837)

Regarding claims 5 and 9, Ngo et al. discloses employing SiH_4 to form the nitrogen-free silicon oxide layer (col. 4, lines 50-60).

Ngo et al. does not specifically show using CO_2 , the nitrogen-free silicon oxide layer being a silicon oxycarbide layer. However, Xu et al. discloses employing a silicon oxycarbide layer below the photoresist layer and using CO_2 (col. 6, lines 58-62, col. 8, lines 40-60).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Ngo et al. reference by using CO_2 and the silicon oxycarbide layer as taught by Xu et al. in order to reduce photoresist poisoning (Xu et al., col. 2, lines 25-29).

4. Claims 2, 10-16, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ngo et al. (U.S. 6,093,973) in view of Lee et al. (U.S. 6,376,392) and Xu et al. (U.S. 6,656,837).

Ngo et al. teaches forming a nitrogen-free silicon oxide layer having a refractive index of 1.47 (the extinction coefficient inherently is 0) overlying an antireflective structure, forming a patterned photoresist layer overlying the nitrogen-free silicon oxide layer (Abstract, Fig. 3, col. 2, lines 40-45, col. 4, lines 14-28, 65-67, col. 5, lines 1-4).

Ngo et al. is silent about the nitrogen-free silicon oxide layer serving as a protective layer and removing the patterned photoresist layer. However, the nitrogen-free silicon oxide layer serving as a protective layer and the step of removing the patterned photoresist layer are inherent because necessarily flows from Ngo et al. reference. Ngo

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et al. shows the oxide as a hard mask and forming metal interconnections; therefore, the patterned photoresist layer is removed and the nitrogen-free silicon oxide layer is serving as a protective layer (Abstract, col. 6, lines 25-45). Ngo et al. teaches the nitrogen-free silicon oxide layer having a thickness of no greater than 350 angstroms and being formed by plasma enhanced chemical vapor deposition (col. 2, lines 57-60, col. 4, lines 41-45). Ngo et al. discloses employing SiH₄ to form the nitrogen-free silicon oxide layer (col. 4, lines 50-60).

Ngo et al. does not specifically show the dielectric anti-reflective layer as being nitrogen-free. However, Lee et al. shows the use of the nitrogen-free dielectric anti-reflective layer as well known in the art (Abstract, col. 1, lines 60-63, col. 2, lines 51-55).

Ngo et al. does not specifically show using CO₂, the nitrogen-free silicon oxide layer being a silicon oxycarbide layer, the nitrogen-free silicon oxide layer being formed insitu. However, Xu et al. discloses employing a silicon oxycarbide layer below the photoresist layer, the nitrogen-free silicon oxide layer being formed insitu, and using CO₂ (col. 6, lines 58-62, col. 8, lines 40-60).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Ngo et al. reference by including the nitrogen-free dielectric anti-reflective layer as taught by Lee et al.; the nitrogen-free silicon oxide layer being formed insitu, using CO₂, and the silicon oxycarbide layer as taught by Xu et al. in order to avoid footings and to reduce photoresist poisoning (Lee et al., col. 2, lines 24-27; Xu et al., col. 2, lines 25-29).

Response to Arguments

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5. Applicant's arguments filed May 17, 2004 have been fully considered but they are not persuasive. Claims 1-6, 8-16, and 18-20 stand rejected.

Applicant argued that the nitrogen-free silicon oxide disclosed by Ngo et al. does not have an extinction coefficient in the range as claimed. However, the examiner is presenting a new evidence to show that the nitrogen-free silicon oxide disclosed by Ngo et al. inherently has the extinction coefficient in the range as claimed. Van Schravendijk et al. is another evidence to show that the nitrogen-free silicon oxide disclosed by Ngo et al. inherently has the extinction coefficient in the range as claimed. See Van Schravendijk et al., col. 4, lines 65-67, col. 5, lines 1-15).

The claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. In re Best, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). Note that as long as there is evidence of record establishing inherency, failure of those skilled in the art to contemporaneously recognize an inherent property, function or ingredient of a prior art reference does not preclude a finding of anticipation. Atlas Powder Co. v. IRECO, Inc., 190 F.3d 1342, 1349, 51 USPQ2d 1943, 1948 (Fed. Cir. 1999).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yu et al. (U.S. 6,057,218) and Tao et al. (U.S. 6,174,818) (Fig. 3-

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5, col. 2, lines 53-60) are cited as evidence to show that the nitrogen-free silicon oxide layer serving as a protective layer and the step of removing the patterned photoresist layer are inherent from Ngo et al. reference. Yu et al. shows the hard mask oxide layer as protecting the underlayer during the step of removing the patterned photoresist layer (Fig. 2e-2h, col. 4, lines 57-60, col. 5, lines 20-25). Fujisawa et al. (U.S. 6,395,973) is cited as evidence to show that the nitrogen-free silicon oxide layer taught by Ngo et al. inherently has an extinction coefficient of 0 (col. 5, lines 65-67, col. 9, lines 1-2, col. 14, lines 30-33). Cheung et al. (EP 0840361 A2) shows employing a silicon oxide hard mask having low nitrogen between an anti-reflective layer and photoresist layer and varying the thickness of silicon oxide hard mask from 0 to 1000 angstroms (col. 5, lines 35-40, col. 22, lines 25-36).

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

July 23, 2004


MARIA F. GUERRERO
PRIMARY EXAMINER
